

WHAT IS CLAIMED IS:

1. A system for holding and releasing a workpiece for electrochemical machining, the system comprising:
  - a workpiece holder having a workpiece surface configured to couple to the workpiece in response to a negative pressure being applied to the system to provide a seal between the workpiece and the workpiece surface;
  - a plenum disposed within the workpiece holder having a proximal end capable of being removably coupled to the workpiece; and
  - a piston configured to move upward in the plenum towards the workpiece and to lift the workpiece off of the workpiece surface in response to a positive pressure being applied to the system.
2. The system of claim 1, further comprising an electrode disposed above the workpiece by a machining gap, the electrode having a pattern and configured to provide a conductive electrolyte to the machining gap such that the pattern is imposed on the workpiece.
3. The system of claim 2, further comprising a radial locator capable of being removably coupled to the workpiece holder and configured to radially locate the workpiece on the workpiece surface.

4. The system of claim 2, wherein the workpiece surface is further configured to provide an anodic contact and to resist anodic corrosion.
5. The system of claim 4, wherein the workpiece surface comprises titanium.
6. The system of claim 2, wherein the workpiece surface has a finish with a roughness average of .05 to .1 microns.
7. The system of claim 2, further comprising a base having a locating surface and configured to support the workpiece holder.
8. The system of claim 7, wherein the degree of parallelism between the workpiece surface and the locating surface is 1 micron.
9. The system of claim 2, wherein the piston includes a base portion and an ejector pin, the ejector pin configured to lift the workpiece off of the workpiece surface.
10. The system of claim 9, wherein the ejector pin includes a magnet capable of removably coupling the workpiece to the ejector pin.
11. The system of claim 2, wherein the piston includes air passages configured to provide a flow path between the proximal end of the plenum and a vacuum port.

12. The system of claim 11, wherein the piston includes an O-ring configured to provide a seal between the air passages and the proximal end of the plenum in response to the positive pressure being applied to the system.

13. A method for holding and releasing a workpiece for electrochemical machining, the method comprising:

applying a negative pressure to a plenum to produce an air flow through the  
plenum;

loading the workpiece onto a workpiece surface to couple the workpiece to a  
proximal end of the plenum;

forming a seal between the workpiece and the workpiece surface to produce a  
pressure drop across the workpiece;

applying a positive pressure to the plenum; and

lifting the workpiece off of the workpiece surface.

14. The method of claim 13, further comprising the step of providing a conductive electrolyte to a machining gap to impose a pattern on the workpiece.

15. The method of claim 14, wherein a piston that is configured to move upward within the plenum in response to the application of the positive pressure lifts the workpiece.

16. The method of claim 14, further comprising the step of coupling the workpiece to an ejector pin.

17. The method of claim 14, wherein the workpiece surface is configured to provide an anodic contact and to resist anodic corrosion.

18. A system for holding and releasing a workpiece for electrochemical machining, the system comprising:

means for applying a negative pressure to a plenum to produce an air flow through the plenum;

means for loading the workpiece onto a workpiece surface to couple the workpiece to a proximal end of the plenum;

means for forming a seal between the workpiece and the workpiece surface to produce a pressure drop across the workpiece;

means for applying a positive pressure to the plenum; and

means for lifting the workpiece off of the workpiece surface.

19. The system of claim 18, further comprising means for providing a conductive electrolyte to a machining gap to impose a pattern on the workpiece.

20. The system of claim 19, further comprising means for coupling the workpiece to an ejector pin.